(12) UK Patent Application (19) GB (11) 2 341 850 (13) A

(43) Date of A Publication 29.03.2000

(21) Application No 9922824.9

(22) Date of Filing 27.09.1999

(30) Priority Data
(31) 28917317 (32) 26.09.1998 (33) DE

(51) INT CL[7]
B41F 21/00 21/10 , B65H 29/24 29/54

(52) UK CL (Edition R)
B8R RL1 R711 R742

(56) Documents Cited
EP 0322576 A1

(58) Field of Search
UK CL (Edition Q) B8R RAJ4 RL1 RL2
INT CL[6] B41F 21/00 21/10 , B65H 29/24 29/54 29/56
ONLINE: EPODOC

(71) Applicant(s)
MAN Roland Druckmaschinen AG
(Incorporated in the Federal Republic of Germany)
Mühlheimer Straße 341, 63075 Offenbach am Main,
Federal Republic of Germany

(72) Inventor(s)
Hendrikus Beaumont
Peter Wulf

(74) Agent and/or Address for Service
Gallafent & Co
9 Staple Inn, LONDON, WC1V 7QH, United Kingdom

(54) Abstract Title
Sheet guiding arrangement

(57) The invention relates to a sheet guiding arrangement with a guide surface in a printing press, which permits even sheet guidance along the guide surface (16) and noticeably reduces damage to the printed material (22). This is solved in that a comb-shaped sheet guiding unit (15) is arranged between a first sheet guiding unit (11) and a transfer region (25), wherein the tines (17) of the sheet guiding unit (15) are subjected pneumatically to blown air and therefore assisting in the peeling off of the printed sheet (22) from the upstream cylinder (4) at a peel off angle (α).

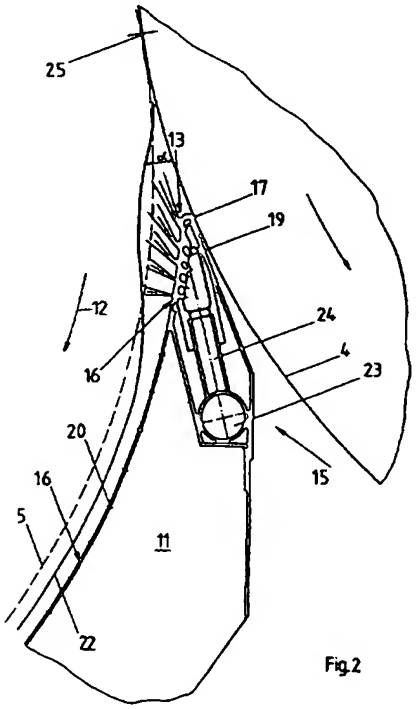

Fig.2

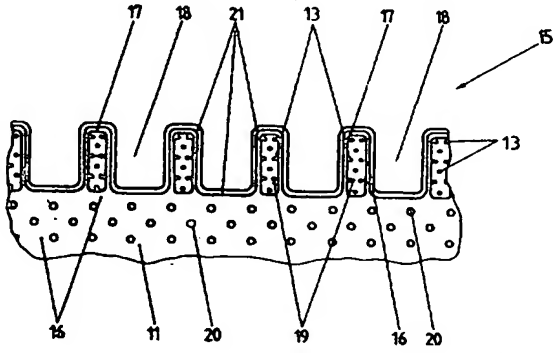

Fig. 3

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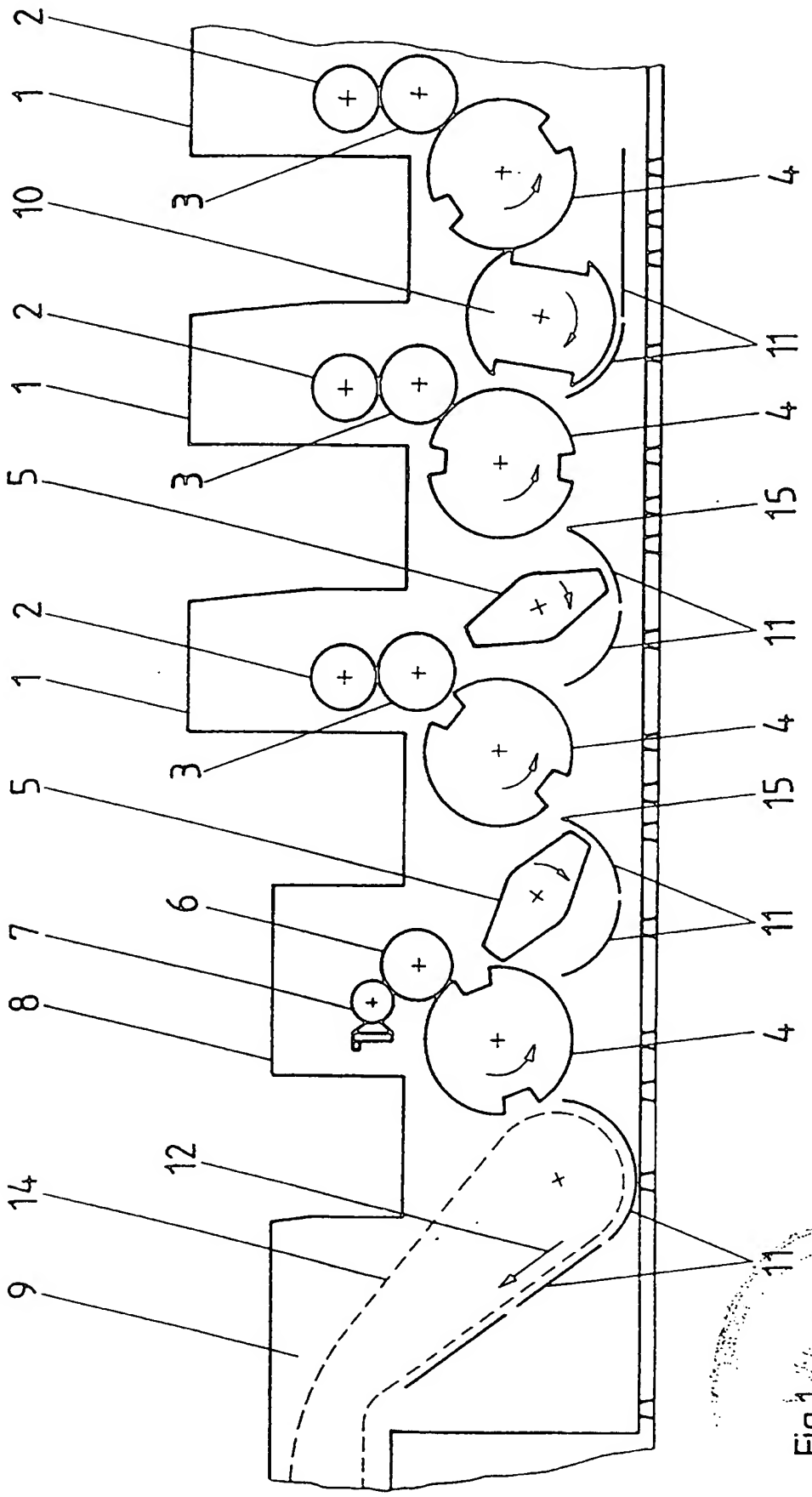

Fig.1

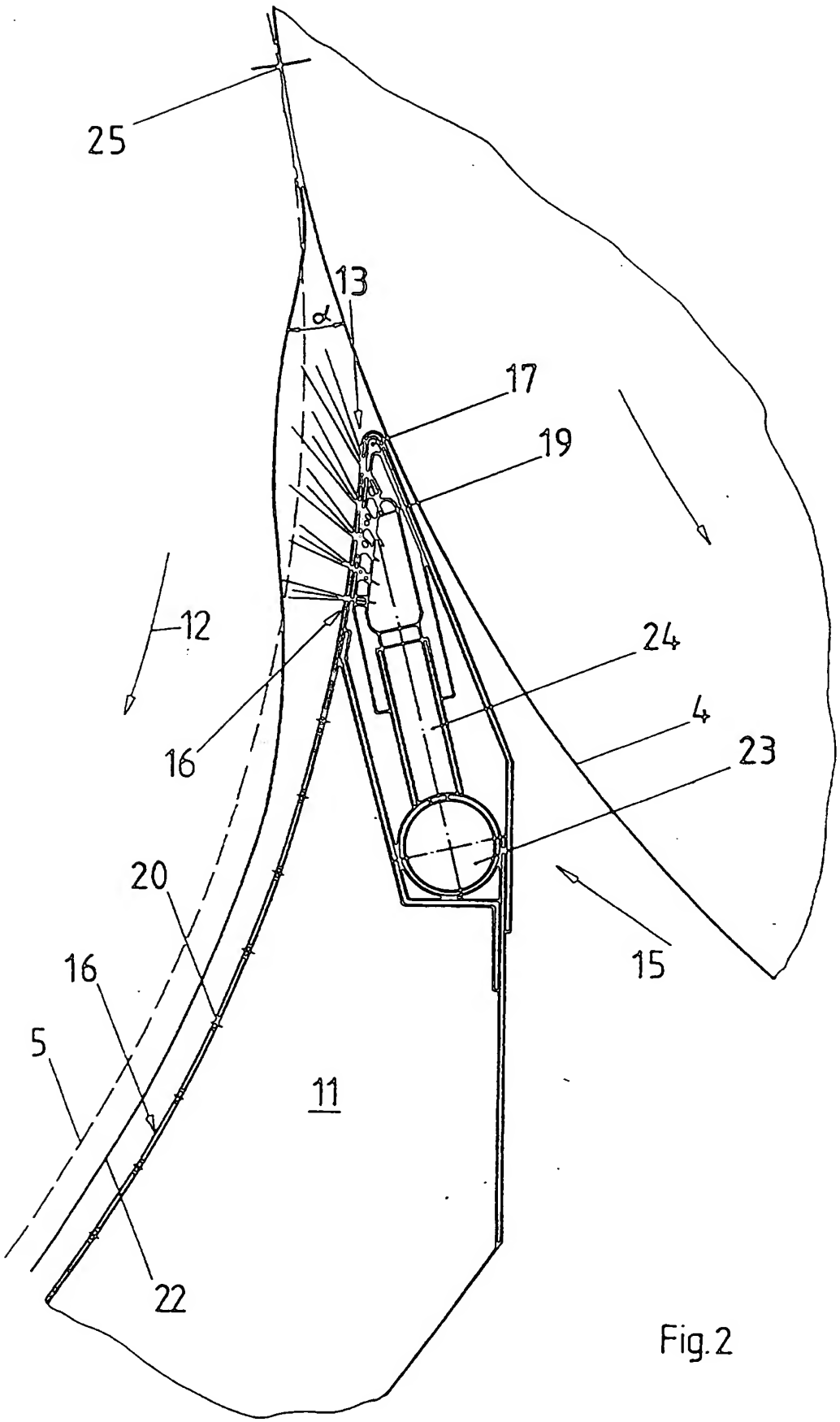

Fig.2

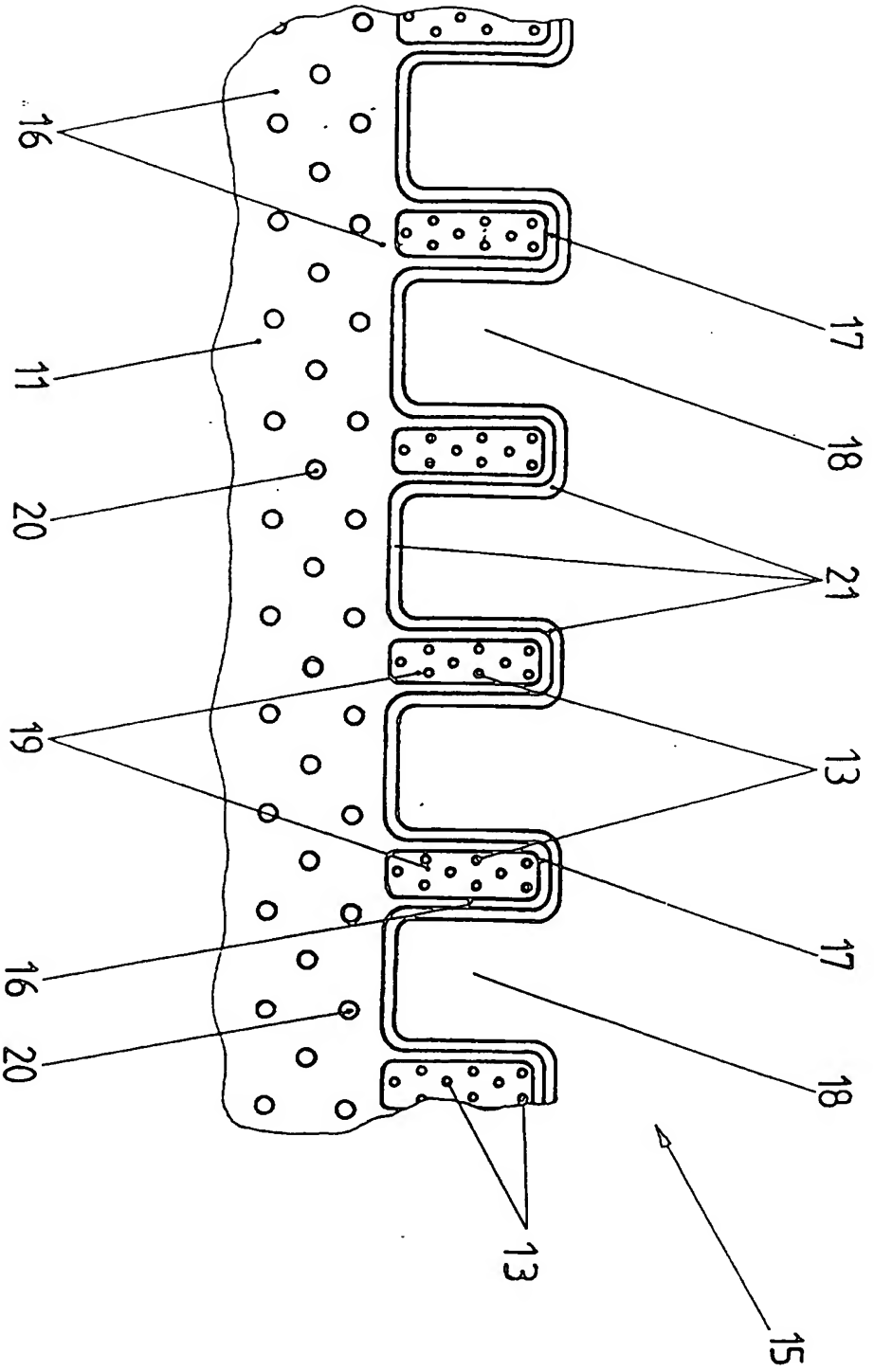

Fig. 3

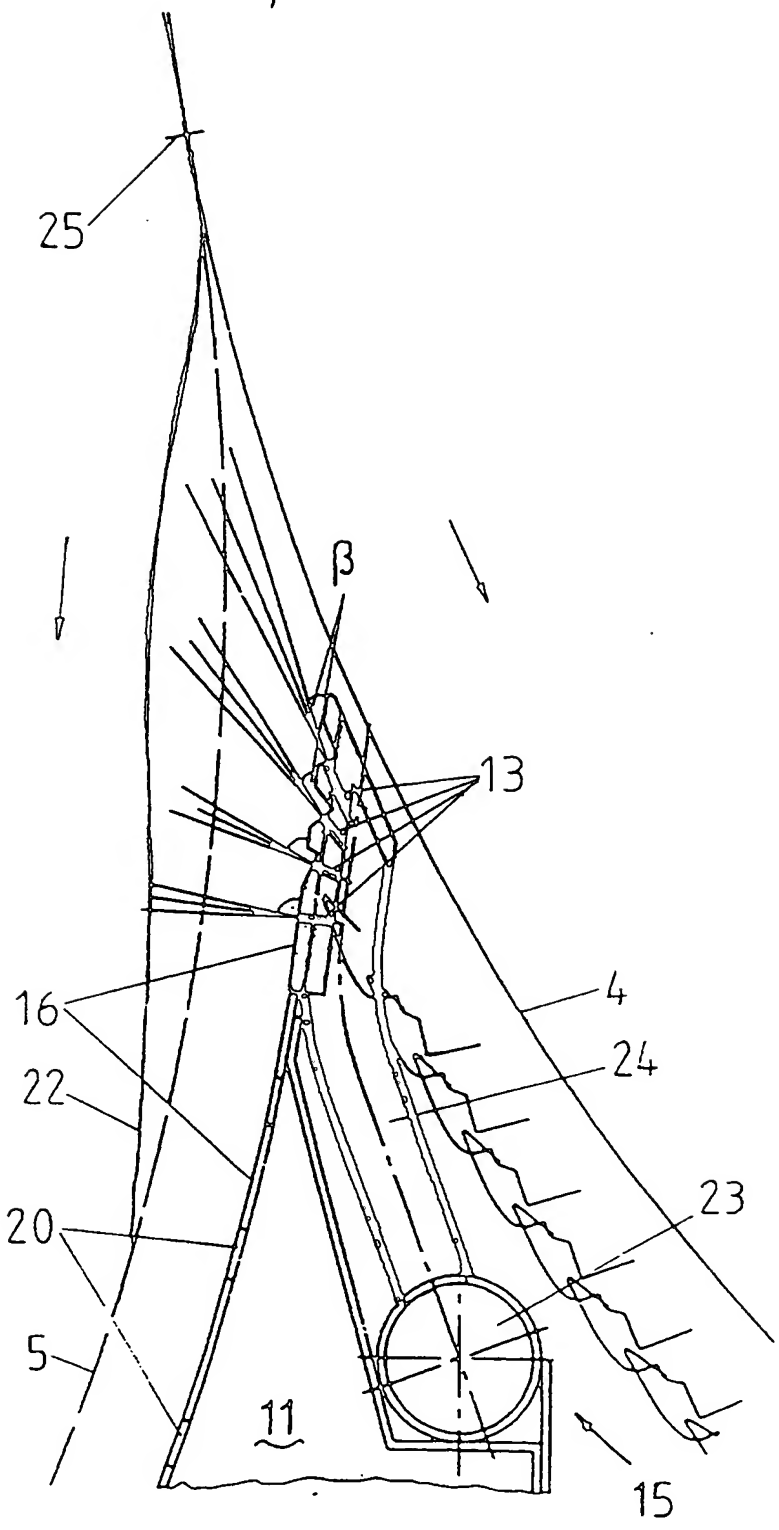

Fig. 4

SHEET GUIDING ARRANGEMENT WITH A GUIDE SURFACE IN A PRINTING PRESS

This invention relates to a sheet guiding arrangement with a guide surface, for use in a printing press.

EP 0 156 173 B1 discloses a sheet guiding unit formed with a unitary guide surface by a plurality of air supply boxes (flow channels) constructed of modules and linked with fans. The air supply boxes have openings as air nozzles in the guide surface which can be subjected by the fans to suction or blown air. In addition to this, it is known that this type of air supply box can be constructed with comb-shaped ends which are components of the air supply boxes and accordingly are a flow channel.

Disadvantageous, in this connection, is that this construction alone takes too little account of the behaviour of the sheets with differing materials to be printed or of different types of printing (single side printing, perfect printing).

From DE 297 20 989.2, a comb-shaped accessory element is known which is arranged on a sheet guiding unit, particularly for single side printing operation and which

is fitted with its tines to the transfer region of two gripper systems with the object of guiding the sheet. Disadvantageous, in this connection, is that the sheet lying on the sheet guiding cylinder after transfer adheres strongly to the cover surface of the prior arranged sheet guiding cylinder, so that the "peeling off process" of the sheet from the cover surface of the sheet guiding cylinder takes place lagging. Therewith, there is the danger that especially in the case of printed undersides, the sheets can smear off or be scratched against this accessory element, or jam.

According to the present invention, there is provided a sheet guiding arrangement with a guide surface in a printing press which is to be fitted adjacent a transfer region between two gripper systems wherein the unit includes a first sheet guiding unit and a second comb-shaped sheet guiding unit fitted additionally between the transfer region and the sheet guiding unit, wherein the comb-shaped sheet guiding unit has a guide surface which is flush with the guide surface of the first sheet guiding unit in the sense of its curvature, has a plurality of tines arranged on a guide bar, the tines being arranged with free spaces relative to one another thereby forming spaces for allowing the passage of gripper systems between them, and is linked with a pneumatic lead for the supply of blown air, the pneumatic lead being functionally connected with blown air nozzles integrated into the tines.

Such a sheet guiding arrangement may be constructed and designed to avoid the disadvantages noted above, especially improving the peeling off process of a sheet from a sheet guiding cylinder. The arrangement also permits a more even smear-free sheet guidance in single side printing as well as preferably in perfect printing along one guide surface of the sheet guiding arrangement.

In practice, the comb-like sheet guiding arrangement with a guide surface which can be subjected to pneumatic action, is fitted immediately adjacent the transfer region of two gripper systems. The gripper systems can, in this connection, be arranged on a sheet guiding cylinder and/or a circulating chain system. A first advantage of the sheet guiding arrangement in accordance with the invention is to be found in that a sheet is peeled off from a sheet guiding cylinder directly after transfer by means of pneumatic support. In this peeling off process, the sheet is released from the upstream sheet guiding cylinder and pressed in the direction towards the sheet guiding cylinder arranged downstream in the feed direction. The pneumatic support is, in this connection, capable of being effected by a pulse stream formed via a plurality of blown airstreams. Thereby the sheet is diverted from the ideal sheet feed plane by means of blown air. I.e. the peeling off angle α between sheet and the previously arranged sheet guiding cylinder is increased. By this peel off angle α, the accelerated peeling off of the sheet from the sheet guiding cylinder is supported and the still touching regions of sheet and sheet guiding cylinder have a noticeably reduced decreasing movement friction during the transfer process. Thereby the pulling forces acting on the printed material also reduce. A further advantage of the construction consists in that the sheet guiding arrangement in accordance with the invention - without generating damage in the region of the sheet rear edge - projects as close as possible into the transfer region and by means of the pneumatic support, the sheet guiding arrangement has an air blade function relative to the cover surface of the neighbouring sheet guiding cylinder. Furthermore, the sheet guiding arrangement can be releasably coupled with a further sheet guiding unit, for example in accordance with EP 0 156 173 B1, or this sort of a sheet guiding unit is preferably separately arranged upstream in the

feed direction. A further advantage is grounded in that at least the tines have a peripheral rounding, at least on the guide surfaces turned towards the printed material. Thereby any possible tearing in the region of the sheet rear edge is avoided.

The application of sheet guiding arrangements of the present invention is not limited to the construction described below with reference to an illustrated exemplary embodiment. Rather, the arrangements are also suited for further areas of application within the press. Thus, for example, the sheet guiding arrangement can be fitted in the sheet rise of a sheet guiding unit upstream in the feed direction of the transfer region of two gripper systems. In a further construction, the sheet guiding arrangement is arranged above a sheet guiding cylinder downstream relative to the transfer region of two gripper systems and directed against the feed direction.

The invention is illustrated and explained in more detail by way of example with reference to embodiments shown in the accompanying drawings, in which, schematically:

Figure 1 shows a rotary sheet printing press of serial construction with sheet guiding units,

Figure 2 is a section through a sheet guiding arrangement installed in the transfer region of two sheet guiding cylinders,

Figure 3 shows a detail of the sheet guiding arrangement shown in Figure 2,

Figure 4 shows in section a further sheet guiding arrangement, installed in the transfer region between two sheet guiding cylinders.

Referring to Figure 1, this shows in diagrammatic side view a rotary sheet printing press consisting of several printing units 1 together with a varnishing unit 8 which are arranged in series in the feed direction 12. Arranged downstream of the varnishing unit 8 in the feed direction 12 is a delivery 9 with circulating chain systems 14 which transport printed sheets grasped by closed grippers to a delivery pile and deposit them there. Each printing unit 1 consists of a single size plate cylinder 2, a single size blanket cylinder 3 and a double size sheet guiding cylinder 4, here as an impression cylinder. Fitted to each plate cylinder 2 is an inking unit and if appropriate a damping unit as to which one does not need to go into this further here. The varnishing unit 8 has a metering system 7, e.g. a chamber doctor with rastered applicator roller which is functionally connected with a forme cylinder 6. Fitted to the forme cylinder 6 in turn is a sheet guiding cylinder 4, here as impression cylinder.

Between the printing units 1 and the varnishing unit 8, sheet guiding cylinders 5 are arranged which are constructed here as transfer drums. In this connection, at least one sheet guiding cylinder 5 is constructed as a turning unit 10, i.e. the transfer drum is substituted e.g. by a double size turning drum. In this connection, within the rotary printing press, a multiple arrangement of turning devices 10 can be effected. The sheet guiding cylinders 4, 5, the turning unit 10, as well as the chain systems 14 have gripper systems for sheet transport. Fitted adjacent the sheet guiding cylinders 5, the turning devices 10 as well as adjacent the chain systems 14 are sheet guiding units 11 preferably arranged modularly which are formed by air supply boxes linked with fans.

Referring to Figures 2 to 4, these show in detail the

arrangements adjacent a transfer region 25 in which a sheet 22 is transferred from a first gripper system to a second gripper system. As shown in Figures 2 and 4 show downstream of the transfer region 25 between two sheet guiding cylinders 4, 5, in which the feed direction 12 of the sheet is downwards. The sheet guiding unit 11 has a guide surface 16 which has a openings 20 for the emergence of blown air, or for the entry of sucked air. On the end adjacent the guide surface 16 between the body of the sheet guiding unit 11 and the transfer region 25 is arranged a comb-shaped sheet guiding unit 15, preferably releasably, which projects closely towards the transfer region 25. The comb-like sheet guiding unit 15 has in turn a guide surface 16 which is arranged flush with the guide surface 16 of the sheet guiding unit 11 in its sense of curvature.

Furthermore, the comb-shaped sheet guiding unit 15 has across the width of the sheet guiding cylinder 4, 5 a plurality of tines 17 which are arranged on a guide bar 19. The tines 17 are arranged at a defined distance to one another and accordingly leave free spaces 18 between them through which the gripper systems of the upstream sheet guiding cylinder 4 (which, in this region, no longer guides any sheet 22) can pass. The guide rail 19 lies flush with the guide surface 16 across the format width again in the sense of the curvature. At least across the format width of the sheet 22, a tubular pneumatic lead 23 coupled with a pneumatic system for blown air supply is fitted to the guide rail 19. Corresponding to the number and arrangement of the tines 7, the pneumatic lead 23 has several posts 24 which are functionally connected with blown air nozzles 13. The blown air nozzles 13 are, in this connection, integrated into the tines 17 so that a blown airstream emerges at the guide surface 16 of the comb-shaped sheet guiding unit 11. The blown air nozzles 13 preferably have pre-

chambers and from these pre-chambers the blown air preferably emerges in a fanning out shape from the guide surface 16, as indicated in Figure 2.

In Figure 4, a further development of the comb-shaped sheet guiding unit 15 is shown. In this connection, the guide surface 16 is arranged flush with tines 17, and several depressions are formed in the guide surface 16, e.g. slots or grooves, which incorporate the blowing air nozzles. The depressions may be constructed parabola-shaped. As shown in the construction illustrated, the inclination of the slots or grooves varies, so that the angle of inclination β and accordingly the direction of the blown air blown through nozzles 13 can be fixed. In other words, in these depressions, the blown air nozzles 13 are integrated at defined angles of inclination β relative to the surface 16. These angles of inclination β of the blown air nozzles 13 are preferably acute close to the transfer region 25 and increases as the nozzles are further removed from the transfer region 25, substantially approaching a right angled arrangement. In this connection, at least a part of the blown air nozzles 13 are preferably arranged at an angle of inclination β obliquely to the transfer region 25 (Figure 4).

The blown air supply to the blown air nozzles 13 can take place continuously. In addition to this, it is controllable or regulatable in such a fashion that the blowing action of the blown air nozzles 13 can be reduced in rhythm - after each sheet end has passed the printing slot on the upstream arranged sheet guiding cylinder 4.

In preferred fashion, at least the tines 17 have an overall peripheral rounding 21. The rounding 21 are preferably constructed, in this connection, with a radius of 1.0 to 5.0 mm. In a further development, the tines 17 can also be constructed as tubes. The tubular tines 17

have a plurality of narrow guide surfaces 16 with blown air nozzles 13.

The arrangement of the comb-shaped sheet guiding unit 15 can be effected on all sheet guiding units 11 which are fitted to transfer regions 25.

The comb-shaped sheet guiding unit 15 is fitted at least to the sheet guiding unit 11 of two sheet guiding cylinders 4, 5, to which a turning unit 10 is arranged downstream in the feed direction 12. Here the sheet 22 lies with its printed underside on the cylinder cover surface, the printed underside adheres more strongly than the unprinted underside of a sheet 22 and is peeled away by means of sheet guiding unit 15 from this sheet guiding cylinder 4.

The mode of operation is as follows: in the transfer region 25, the sheet 22 is transferred from a rotating sheet guiding cylinder 4 (impression cylinder) in the feed direction 12 to the rotating sheet guiding cylinder 5 (transfer cylinder) by its front edge. The sheet 22 adheres, in this connection, after the transfer region 25 still with a part of the sheet 22 on the cover surface of the sheet guiding cylinder 4. The comb-shaped sheet guiding unit 15 projects adjacent to the transfer region 25 and by means of blown air peels the remaining sheet 22 in contact-free fashion (relative to the sheet guiding unit 15) from the cover surface of the sheet guiding cylinder 4. The sheet 22 is, by the action of blown air, fed away guided from the feed plane away (from the sheet guiding cylinder 4) at a peel off angle α. By the peeling off of sheet guiding cylinder 4 and preferably in combination with the roundings 21, possible damage to the sheet 22 is avoided and the sheet 22 is guided evenly.

In single side printing, the comb-shaped sheet guiding

unit 15 can also be used for sheet guiding even without blown air support. The subsequently arranged sheet guiding unit 11 is then capable of being driven by means of suction. In perfect printing, the comb-shaped sheet guiding unit 15 can be subjected to blown air. The downstream arranged sheet guiding unit is then likewise subjected to blown air. In this connection, the sheet guiding units 11, 15 can be subjected to differing air feed powers.

CLAIMS

1. A sheet guiding arrangement with a guide surface in a printing press which is to be fitted adjacent a transfer region between two gripper systems wherein the unit includes a first sheet guiding unit and a second comb-shaped sheet guiding unit fitted additionally between the transfer region and the sheet guiding unit, wherein the comb-shaped sheet guiding unit has a guide surface which is flush with the guide surface of the first sheet guiding unit in the sense of its curvature, has a plurality of tines arranged on a guide bar, the tines being arranged with free spaces relative to one another thereby forming spaces for allowing the passage of gripper systems between them, and is linked with a pneumatic lead for the supply of blown air, the pneumatic lead being functionally connected with blown air nozzles integrated into the tines.

2. A sheet guiding arrangement according to Claim 1 wherein at least the tines have a peripheral rounding.

3. A sheet guiding arrangement according to Claim 2 wherein the rounding on at least the tines has a radius of 1.0 to 5.0 mm.

4. A sheet guiding arrangement according to any one of Claims 1 to 3 wherein at least some of the blown air nozzles - taken with reference to the guide surface - are arranged to blow air at an angle of inclination oblique thereto.

5. A sheet guiding arrangement according to Claim 4 wherein the blown air nozzles are arranged in depressions.

6. A sheet guiding arrangement according to Claim 5 wherein the depressions are constructed parabola shaped.

7. A sheet guiding arrangement substantially as hereinbefore described with reference to Figures 2 to 4 of the accompanying drawings.

8. An offset sheet printing press including a sheet guiding arrangement in accordance with any one of the preceding claims.

9. An offset sheet printing press according to Claim 8 wherein the comb-shaped sheet guiding unit is arranged in the sheet downward path subsequent to the transfer region in the direction of feeding.

10. An offset sheet printing press according to Claim 8 wherein the comb-shaped sheet guiding unit is arranged upstream in the feed direction of the transfer region in a position in which the path of the sheet is rising.

11. An offset sheet printing press according to Claim 8 wherein the comb-shaped sheet guiding unit, arranged above a sheet guiding cylinder is arranged extending towards the transfer region counter to the feed direction.

12. An offset sheet printing press according to Claim 8 wherein the comb-shaped sheet guiding unit is fitted adjacent the transfer region between two sheet guiding cylinders, wherein a turning device is arranged upstream of the upstream arranged sheet guiding cylinder.

Application No: GB 9922824.9 **Examiner:** Carol Davies
Claims searched: 1-12 **Date of search:** 2 December 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B8R (RL1, RL2, RAJ4)

Int Cl (Ed.6): B65H 29/24, 29/54, 29/56; B41F 21/00, 21/10

Other: ONLINE: EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP 0922576 A1 (MAN ROLAND) See Figures	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.